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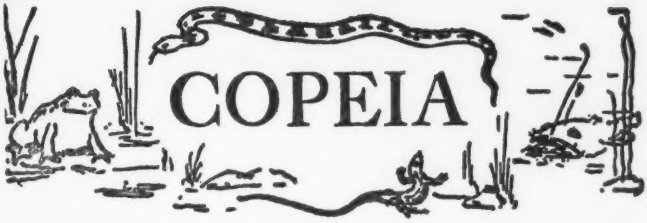

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THE FIGHTING-FISH OF SIAM

Mr. George S. Myer's reference to the fighting-fish of Siam in his "Notes on Anabantids" in the January, 1926, issue of Copeia prompts me to write a short article on the subject. Any merit the article may have arises from the opportunity for observation that has come from three years' residence in Siam and from the possession of many living and preserved specimens of Betta.

Our knowledge of the taxonomy and distribution of the genus Betta was greatly extended by Regan's revision in the Proceedings of the Zoological Society of London in 1909. That revision listed 14 species, of which 8 were described as new. Weber and de Beaufort (The Fishes of the Indo-Australian Archipelago, Vol. IV), described one new species (*B. patoti*), revived an old one (*B. picta*), discarded by Regan, and assigned 3 of Regan's new species to synonymy, so that the number of species of Betta now recognized may be stated as 13.

Among Regan's new forms is *B. splendens*, which is the common fighting-fish of Siam and the only species credited to that country. *Betta pugnax* appears to be restricted to Penang.

The literature of Betta as a fighting-fish is replete with inaccuracies and absurdities. An unusually large number of these occurs in a short paragraph in the article entitled "The Heavenly-Royal City of Siam," by Florence Burgess Meehan (*Asia*, March, 1921), to which Mr. Myers refers and from which he not unnaturally obtained erroneous impressions; this paragraph is as follows:

"The fighting-fish are about the size of goldfish. You catch one and put it into a bottle. Your neighbor does likewise. You put your bottle close to your neighbor's. Your fish becomes enraged. So does your neighbor's fish. They both flash all colors of the rainbow. They swell up. You bet on your fish. Your friends back you. After a time one fish or the other, hurling itself against the glass in a vain effort to reach its adversary, becomes so angry that it literally bursts. If it is your neighbor's fish that bursts, you win. If it is yours, you lose."

The writer of this paragraph certainly never saw what she was writing about, and the untrustworthiness of the account may be judged from the following facts:

The Siamese fighting-fish cannot properly be described as "about the size of a goldfish," whatever may be the meaning of that expression. The fish are not matched while in separate "bottles," and when not fighting are usually kept in special rectangular jars about 9.5 cm. square and 25 cm. high, and a little larger at the top than at the bottom. When fighting, the fish do not "flash all colors of the rainbow," do "not swell up," do not "hurl themselves against the glass," and do not "literally burst."

With these exceptions, the account quoted is nearly correct, but not quite. For instance, the impression is conveyed that if you wish to stage a fight you and your neighbor go out and catch wild fish, whereas practically all the combats are between domesticated fish. Fighting-fish have been cultivated and domesticated among the Siamese for many years, and all of

the noteworthy combats on which sums of money are wagered are with selected, often pedigreed, stock.

There are in Bangkok 10 or 12 persons who breed fighting-fish for sale, and about 1,000 persons who raise fighting-fish for their own use. A dealer whom I recently visited reports an annual production of 50,000 young, but only a small percentage of these are carried to the fighting age and sold. For the best males the current retail price per fish is 1 to 2 ticals, females half price (1 tical equals 44 cents gold). There are 10 licensed places where public fighting-fish combats and betting thereon are permitted. The sums wagered in such places range from 10 ticals to 100 ticals per fight, but much larger sums may be staked on private matches.

The native wild fish from which the ordinary cultivated fish has been derived rarely exceeds 5 cm. for the males, the females being smaller. The cultivated fish reach a length of 6.5 cm. for the males.

The way in which the male fish are matched and their method of fighting are well known. It will suffice to state that the combatants are placed together in a bowl or jar and quickly come to close quarters, expanding their fins and branchial membranes and displaying the gorgeous red, blue, and green shades that have made the fighting-fish famous. They approach one another quietly and may remain in close relation, side by side, for ten to fifteen seconds or longer without action. Then, in quick succession or simultaneously, they launch an attack almost too swift for the observer's eye to follow, and this is repeated at short intervals during the continuance of the combat. The effect of the fierce onslaughts begins to be seen in the mutilation of the fins, which may soon present a ragged appearance and considerable loss of fin substance may occur. The branchial region may come in for attack, and blood may exceptionally be drawn. On two separate occasions my own fish locked jaws and remained in that position for a number of minutes.

That fish is adjudged the victor which is ready to continue to fight while its opponent is no longer eager for the fray and tries to avoid coming to close quarters.

The effect of cultivation and selective breeding on the fighting qualities of Betta is remarkable. Wild male fish will readily fight in captivity as soon as they become somewhat accustomed to their surroundings, say in the course of two or three days, but they lack stamina and rarely continue their attacks for longer than 15 minutes and usually quit much sooner. Cultivated fish that will not fight actively for 60 minutes are regarded as failures, and the best stock will continue to attack up to 6 hours.

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AN ADDITIONAL RECORD OF THE LEATHER-BACK TURTLE ON THE COAST OF CALIFORNIA

As there are very few published records of the great Leather-back Turtle (*Dermochelys schlegelii*) in the Pacific and especially off the coast of California, the following Californian records may be of interest.

Apparently the first record is that of a specimen taken at sea about two miles south of Santa Barbara. This specimen, which measured six feet seven inches in length and weighed about 800 pounds, was purchased by the California Academy of Sciences but was destroyed in the great fire of 1906.

A second and much larger specimen was taken six miles east of the Santa Cruz Light in July, 1923, by a fish trawler belonging to the San Francisco International Fish Company and presented to the Academy. This turtle measured eight feet in length. The front flippers had a spread of eight feet, and the actual weight was 1,286 pounds. These measurements are very close to those of the nine foot specimen spoken

of by Krefft[1] which he says is "perhaps the most gigantic ever taken."

The Captain of the trawler said this turtle was floating on the surface and, getting into the wake of the vessel, was hit on the head by a propeller blade. A line was then made fast around its neck and it was towed to Santa Cruz.

A cast of this specimen has just been completed and is now in the collections of the Academy.

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RANA AREOLATA AT BLOOMINGTON, INDIANA

Probably no North American *Rana* is so little known, both as to its habits and distribution, as the Northern Gopher Frog, *Rana areolata* Baird and Girard. It has been reported but twice from Indiana, from Benton County (the type of *Rana circulosa* Rice and Davis), and from Terre Haute (*Blatchley*, 24th Ann. Rept. Ind. Dept. Geol. Nat. Res., 1899 (1900), p. 543). Thus it is of interest that on the first night collecting trip of the spring of 1926, March 21st, we found this rare frog at a small pond, not more than 90 feet in diameter, about two miles west of Bloomington. The location was first brought to our attention by the call of the species. We thought it must be *Rana sylvatica* or *R. cantabrigensis*[2] in a nearby pond, but we soon found the noise was distant, and hence louder. Approaching the pond, no further calls were heard. A large frog was seen in the water but it escaped us. A few minutes later another large frog was seen flattening itself against the weeds of the bottom in a few inches of water. It was a huge female of *areolata*, the first either of us

1 Australian Vertebrata—Fossil and Recent.

2 Recorded by Ortenburger, Copeia No. 99, 1921, p. 75, from Warren and Jennings Counties, Indiana.

had ever seen, but immediately recognizable by the profusion of small round spots on the back and sides. It was captured, and later the specimen that escaped us was secured, a male of the same size. This male, preserved and somewhat bent, measures 103 mm. from snout tip to vent, and 230 mm. to tip of outstretched leg and toe. The life measurements were a little greater. The female laid in the laboratory, but the eggs were not fertilized. There were estimated to be over 7000.

We must have arrived at the very beginning of the breeding season, for later, on the night of April 11th, we found *areolata* in full cry and many newly laid masses of eggs. The call, from near at hand, is of the general type of that of *Rana palustris*, but is much louder and quite distinct in timbre. It may best be described as a deep, gutteral, snoring sound, with a slight upward crescendo at the end. It is given at intervals of perhaps ten to fifteen seconds, though we did not time it. The frogs were all very large and extremely wary. They stopped calling and swam to the middle of the pond when we approached within fifty to seventy feet of the edge. We could not induce them to resume while we were at the pond, and it was some time after we left before they were again in full cry. Probably not more than twenty individuals were in the pond when we were there, and most of them seemed to be males, but we counted seventeen egg masses of this species (with others of *R. pipiens*, *R. clamitans*, *Hyla crucifer*, etc.) indicating at least that many pairs.

Several partial egg masses were brought to the laboratory, some of them being placed outside in the concrete pools of the Botany Department. A nearly complete developmental series, excepting the early cleavage stages of the egg, was obtained. The tadpoles in the botany pools began to transform the first week of July. The newly transformed young are approximately 30 mm. from snout tip to vent. A

detailed account of the development will be published later.

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REVISION OF THE GENERA *ALOSA* CUVIER & *POMOLOBUS* RAFINESQUE

Shad investigation in the State of Connecticut where I worked during the summers of 1923 and 1924, involved the necessity of identifying hundreds of specimens of shad and alewives of different age, including juvenals, caught in the Connecticut river and its tributaries, as well as in the Long Island Sound. Besides this material I have had the opportunity to examine several dozens of shad from the Pacific coast, Eastern Canada and Florida, alewifes, glut herrings and hickory shad, procured at the New York Fulton market.

My principal task was to determine the age of shad by the scales; but I made also measurements and studied characteristics of each species in order to elaborate more reliable keys for identification of species in adult as well as in the juvenal stage. The result of that study in the part concerning the method of determining the age, is published in the "Transactions of the American Fisheries Society for 1924," in the part concerning the revision of the genera *Alosa* and *Pomolobus*, based on the measurements, the result is exposed in a special paper which is not yet published. Here I give only artificial keys for the genera *Alosa* and *Pomolobus* and for all known species of both genera.

KEY TO GENERA *ALOSA* AND *POMOLOBUS*

1. At the base of the caudal fin two wing-like plicae of skin, covered with elongate scales (*alae*) on each side, are present. Upper jaw distinctly notched. Vertebrae 56-60. *Alosa.* Cuvier.

2. Alae absent. Upper jaw has no distinct notch. Vertebrae 46-55. *Pomolobus* Rafinesque.

There are three American and two European species of the genus *Alosa*. Here is the key to these species:

a) Gill-rakers more than 90.
b) Scales in longitudinal row 60-80. Gill-rakers 98-126. *Alosa alosa* Linn.
bb) Scales in longitudinal row 56-60. Gill-rakers 90-124. *Alosa sapidissima* Wilson.
aa) Gill-rakers less than 90 and more than 60.
c) Body elongate and slender. Gill-rakers 75. *Alosa ohiensis* Everman.
cc) Body short. Gill-rakers 67. *Alosa alabamae* Jordan & Everman.
aaa) Gill-rakers less than 60 (24-55). *Alosa finta* Cuvier.

Genus *Pomolobus* Rafinesque (alewives) belongs entirely to the North America. There are four known species of this genus and the following key may be used advantageously:

a) Teeth on jaws (with adults) absent.
b) Peritoneum pale.
c) Head short (4 2-3 in length), but high; body heavier forward; lower jaw slightly projecting; gill-rakers slender and numerous (70). *P. pseudoharengus* Wilson (alewife).
cc) Head long (4 in length), but low; body eliptical, lower jaw strongly projecting; gill-rakers short, stout, not numerous (30-31). *P. mediocris* Mitchell (jack, hickory shad).
bb) Peritoneum blackish; head short (5 in length) and low; body elongate, symmetrical; gill-rakers 70. *P. aestivalis* (glut herring, blue-back).
aa) Teeth on jaws present; body elliptical; lower jaw strongly projecting; gill-rakers few (23 below the angle of the arch), short and coarse. *P. chrysocholoris* Rafinesque (skipjack).

PROFESSOR N. BORODIN